THE

Tea Research Institute

OF

Ceylon

BULLETIN No. 33

Annual Report for the Year

1951

Published by
THE TEA RESEARCH INSTITUTE OF CEYLON
ST. COOMBS, TALAWAKELLE, CEYLON,
1953.

The Tea Research Institute of Ceylon

STAFF

DIRECTOR	...	J. Lamb, M.Sc. (Lond.), F.R.I.C., A.I.C.T.A.
Chemical Division		
Biochemist	...	J. Lamb, M.Sc., (Lond.), F.R.I.C. A.I.C.T.A.
Agricultural Chemist	...	F. Haworth, B.Sc., PH.D., (Liv.), Dip. Agric. (Cantab.).
Technologist	...	E. L. Keegel
Research Assistant to Biochemist	...	M. S. Ramaswamy, B.Sc., (Mysore)., A.R.I.C., A.I.I.Sc.
Assistants	...	E. N. Perera, V. Mendis & S. M. Gunaratnam.
Plant Physiology Department		
Plant Physiologist & Deputy Director	...	G. B. Portsmouth, B.Sc., (Lond.), A.R.C.S., D.I.C.
Research Assistant	...	F. H. Kehl
Assistants	...	M. Piyasena & E. S. Rajiah
Pathology Department		
Pathologist	...	C. A. Loos
Mycologist	...	B. N. Webster, B.A., (Cantab.), M.Sc., (Nottm.)
Assistant Pathologist	...	G. D. Austin
Assistant	...	D. J. W. Ranaweera
Engineering Department		
Engineer	...	J. Landreth, A.M.I.B.A.E., Member A.S.A.E.
St. Coombs Estate		
Superintendent	...	F. G. Daniel
Low-Country Sub-Station		
Scientific Officer	...	T. E. Walter, B.Sc., (Edin.)
Assistant	...	F. P. Jayawardana
Administration		
Secretary	...	G. A. D. Kehl
Secretary to the Director	...	A. C. Perera
Asst. Secretary/Librarian	...	G. Mason, B.A., (Lond.)
Accounts Clerk	...	A. H. B. Dias
Stenographers	...	F. G. D. Sielvie & A. Nugara
Asst. Clerks	...	K. A. Salaam & R. L. A. Dissanayake
Small Holdings Advisory Service		
Officer-in-charge	...	R. L. Illankoon
Tea Small Holdings Officers	....	W. T. Fonseka, K. P. Abeywickreme, M. V. de Silva & K. de A. Kulasekera

NOTE

The Laboratories of the Institute are situated at St. Coombs Estate, Talawakelle, and letters and enquiries should be addressed to the Director, Tea Research Institute of Ceylon, St. Coombs, Talawakelle, Telegraphic Address:—Research, Talawakelle, Telephone, Talawakelle 44 (Private Exchange). It is particularly requested that letters should not be addressed to Officers by name.

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TWENTY-SIXTH ANNUAL REPORT OF THE BOARD OF THE TEA RESEARCH INSTITUTE OF CEYLON FOR THE YEAR 1951

Foundation. The Tea Research Institute of Ceylon was established by Ordinance No. 12 of 1925 dated 27th October, 1925.

The personnel constituting the Board of Control is laid down in the above Ordinance and in the Tea Research (Amendment) Act No. 24 of 1948 dated 20th December, 1948.

The members of the Board on the 1st day of January, 1951, were:—

Ex-Officio Members

The Acting Director of Agriculture (Dr. A. W. R. Joachim, M.B.E.)

The Hon'ble the Minister of Finance (Represented by Mr. A. G. Ranasinha, C.M.G., C.B.E., C.C.S.)

The Chairman, Planters' Association of Ceylon (Mr. R. C. L. Notley).

The Chairman, Agency Section, Planters' Association of Ceylon (Mr. G. K. Newton).

Representatives of the Planters' Association of Ceylon

Mr. R. C. Scott, C.B.E.
Mr. H. S. Hurst.
Mr. H. de T. Wilkinson Kay.

Representatives of the Agency Section, Planters' Association of Ceylon

Mr. J. C. Kelly.
Mr. W. H. Attfield.
Mr. R. Singleton Salmon, C.B.E.

Representatives of the Low-Country Products Association

(Vacant)

Representative of the Small Holders

Mr. V. G. W. Ratnayaka, M.B.E., M.P.
Chairman: Mr. R. C. Scott, C.B.E.
Secretary: Mr. J. Lamb, M.SC.
Solicitors: Messrs. Julius & Creasy.
Auditors: Messrs. Ford, Rhodes, Thornton & Co.
Registered Office: St. Coombs Estate, Talawakelle.

The following changes in the personnel of the Board were recorded during the year:—

Ex-officio Members:

Mr. R. S. Davies, Chairman, Agency Section, Planters' Association of Ceylon vice Mr. G. K. Newton as from 18th January, 1951.

Representatives of the Agency Section, Planters' Association of Ceylon:

Mr. R. M. Macintyre, vice Mr. J. C. Kelly as from 31st March, 1951.

Mr. A. D. McLeod, vice Senator R. Singleton Salmon as from 31st March, 1951.

Representatives of the Low-Country Products Association:

Messrs. W. Neal de Alwis, J.P., U.M., Leo de B. Mel, J.P., U.M. and Errol Jayawickreme were renominated as from 6th March, 1951.

Mr. D. E. Hettiarachchi vice, Mr. Leo B. de Mel, J.P., U.M. as from 20th September, 1951.

Dr. A. W. R. Joachim was appointed Director of Agriculture as from 15th January, 1951.

Mr. V. G. W. Ratnayaka, M.P. was appointed Parliamentary Secretary to the Minister of Posts and Telecommunications on 3rd September, 1951.

Four meetings of the Board were held during the year *viz.* on 14th February 20th April, 7th September and 21st December. All meetings were held in Colombo.

Committees

Finance Sub-Committee: The Chairman, Tea Research Institute of Ceylon (Mr. R. C. Scott, C.B.E.); the Chairman, Planters' Association of Ceylon (Mr. R. C. L. Notley); the Chairman, Agency Section, Planters' Association of Ceylon (Mr. G. K. Newton); Messrs. R. Singleton Salmon, C.B.E., H. S. Hurst, J. C. Kelly and the Director & Secretary, Tea Research Institute of Ceylon (Mr. J. Lamb).

The following changes in the membership of the Committee were recorded during the year:—

Mr. R. S. Davies (Chairman, Planters' Association of Ceylon) vice Mr. G. K. Newton as from 18-1-51.

Dr. A. W. R. Joachim, M.B.E. vice Mr. J. C. Kelly as from 20-4-51.

Mr. W. H. Attfield, vice Mr. R. Singleton Salmon as from 20-4-51.

The Committee held two meetings during the year *viz.* on 7th September, and 20th December.

Estate and Experimental Sub-Committee: The Director, Tea Research Institute of Ceylon (Mr. J. Lamb), Chairman; the Chairman, Tea Research Institute of Ceylon (Mr. R. C. Scott, C.B.E.), the Visiting Agent, St. Coombs Estate (Mr. A. H. Hall); the Acting Superintendent, St. Coombs Estate (Mr. Bruce Gibbon); Messrs. P. B. Gruickshank, H. S. Hurst and S. P. Vytilingam. Dr. F. Haworth (Agricultural Chemist) acted as Convenor.

Changes in the personnel of the Committee during the year were:—

Mr. T. Kane acting for Mr. R. H. Horne as from 25th May, 1951.

Mr. S. Bolster, vice Mr. P. B. Cruickshank as from 1-10-1951.

Meetings of the Sub-Committee were held on 5th May, 1st September, 12th November and 8th December.

Low-Country Sub-Station Sub-Committee: Messrs R. C. Scott, C.B.E. Chairman Tea Research Institute of Ceylon, V. G. W. Ratnayaka, M.B.E., M.P. and Mr. R. C. L. Notley, Dr. A. W. R. Joachim, M.B.E. and Mr. J. Lamb (Director, Tea Research Institute).

Messrs. W. Neal de Alwis, J.P., U.M. and Leo B. de Mel, J.P., U.M. resumed their seats on the Committee on their renomination as members of the Board as from 6th February, 1951.

Small Holdings Sub-Committee: Mr. V. G. W. Ratnayaka, M.B.E., M.P., Chairman; Dr. A. W. R. Joachim, M.B.E., Messrs. W. Neal de Alwis, J.P., U.M., J. Lamb, Director, Tea Research Institute of Ceylon and Mr. R. L. Illankoon, Officer-in-Charge, Tea Small Holdings Advisory Service, Convener.

The Committee held one meeting on 1st October.

Trustees—T.R.I. Junior Staff Provident Fund: The Chairman, Tea Research Institute of Ceylon, (Mr. R. C. Scott, C.B.E.), The Director, Tea Research Institute of Ceylon (Mr. J. Lamb), Mr. R. Singleton Salmon, C.B.E. representing the Board of the Tea Research Institute of Ceylon, and Mr. E. N. Perera representing the Junior Staff.

Committee of Management—T.R.I. Junior Staff Medical Fund: The Chairman, Tea Research Institute of Ceylon (Mr. R. C. Scott, C.B.E.), The Director, Tea Research Institute of Ceylon (Mr. J. Lamb), and Mr. G. D. Austin, representing the Junior Staff.

Visiting Agent: Mr. A. H. Hall continued to act as the Visiting Agent for St. Coombs Estate. He paid three visits during the year *viz.* on 15th March, 31st August and 10th October, 1951.

Finance: Total receipts for the year amounted to Rs. 831,913 an increase of Rs. 81,240 over that for the previous year. The Research Cess totalled Rs. 760,620, and was Rs. 17,290 more than 1950. St. Coombs Estate once more recorded a profit of Rs. 63,915 on the year's working account as compared with the loss of Rs. 13,079 made the previous year. There was no change in the receipts from Interest and other Miscellaneous Receipts.

Expenditure on Revenue Account totalled Rs. 660,406, as against Rs. 604,871 in 1950 and comprised Research Revenue Account Rs. 595,853. Interest on Government Loan account Rs. 10,294 and Depreciation Reserve Rs. 54,259.

The balance carried over as excess of Income over expenditure in the Revenue Account for the year was, therefore, Rs. 171,506—an increase of Rs. 25,704 over that of 1950.

Capital expenditure was incurred to the extent of Rs. 290,490 and comprised Rs. 225,350 on Assets and Rs. 64,140 in Repayment of the Government Loan. The expenditure on Assets included Rs. 89,582 on Buildings, Rs.78,018 on the Low-country Sub-Station and Rs. 21,168 on Land Development.

After allowing for liabilities including Furlough and Passage Reserve, Small Holdings Advisory Service and Blister Blight accounts, net liquid assets at 31st December, 1951, amounted to Rs. 379,871. The liability of Rs. 802,760 under Depreciation Reserve was, therefore, covered to the extent of 47%. The balance outstanding on the Government Loan Account at the end of 1951 was Rs. 139,059.

St. Coombs Estate: Mr. Bruce Gibbon continued as acting Superintendent until Mr. F. C. Daniel returned from leave in May 1951 to resume Superintendence of the estate.

1951 proved to be a very successful year for St. Coombs for not only did the year's working end up with a profit of Rs. 63,915 which was Rs. 18,165 over the average for the years 1929 - 1951, but it also recorded the highest yield *viz.* 265,146 lbs. an average of 925 per acre.

This was a very welcome change from the poor year experienced by St. Coombs in 1950 when it, for the first time in its history, recorded a loss at the end of the year.

This has been attributed to increased manurial applications and extremely favourable cropping weather, as also to the effects of the regular spraying programme undertaken against blister blight and the lighter type of pruning adopted.

Low-Country Sub-Station: After an unsuccessful attempt at setting up a sub-station for the low-country at Nivitigallakelle, the Institute was fortunate in being able to acquire a commodious bungalow with two acres of adjacent land at Pembroke Estate, Bombawela, near Kalutara.

The Board is indebted to Messrs. Gordon Frazer & Co. Ltd., for the assistance extended to the Institute on this matter.

Mr. T. E. Walter, Scientific Officer, has been stationed at Kalutara since February 1951, and in addition to undertaking normal advisory work from the low country estates, has laid down some experiments on Vogan Estate, Matugama, on which estate the Directors of the Vogan Tea Company Limited had placed at the disposal of the Institute certain areas of tea which were ideally suited to the requirements of the Institute.

The Board's thanks are due to both the Directors of the Vogan Tea Company Limited and to Mr. J. D. Farquharson, Superintendent of Vogan Estate.

Tea Small Holdings Advisory Service: The year also saw the inauguration of the new Tea Small Holdings Advisory Service. The problem of providing adequate advice, instruction and assistance to small holders was first discussed at a meeting held on 8th April, 1950. Mr. R. C. Scott, C.B.E., Chairman, T.R.I., Mr. D. Rhind, Director of Agriculture, Mr. J. Lamb, Director, T.R.I. Mr. G. B. Portsmouth, Plant Physiologist, T.R.I. and Dr. R. M. Gorrie, were present. Subsequently the sub-committee set up by the Board of the T.R.I. of Ceylon met at St. Coombs on 20th February, 1951, with the following present::—Mr. V. G. W. Ratnayake, M.B.E., M.P. Representative of the Small Holders on the T.R.I. Board of Control, Dr. A. W. R. Joachim, M.B.E., Director of Agriculture, Mr. J. Lamb, Director, T.R.I. and by invitation Mr. U. B. Unamboowe, J.P., U.M.

The recommendations made by the Sub-Committee were accepted by the Board of the Tea Research Institute and a request accordingly made to the

Minister of Agriculture and Lands for financial assistance to implement the proposed scheme.

A Bill was passed by Parliament approving an increase of 5 cents per 100 lbs. of tea exported to meet the cost of the scheme which became effective as from 1st September, 1951.

The scheme was immediately set working and Mr. R. L. Illankoon, the Senior Small Holding Officer, was appointed Officer-in-Charge of the new Small Holdings Advisory Service. Mr. Illankoon has established his head-quarters at Augusta Road, Peradeniya.

Publications. Four parts of the "*Tea Quarterly*" were published during the year despite some lag behind publication dates. The Annual Report for 1949 *viz.* Bulletin No. 31 was published during 1951. Receipts from subscription and sales of publications amounted to Rs. 4,736,26 and from advertisements Rs. 4,400/-. The total cost of printing and distribution was Rs. 17,065.34.

These figures show a deficit of Rs. 7,829.08 under this head, where ten years ago publications yielded a profitable return. Two facts, in particular, account for this turn of events. Firstly, while production costs have increased several times over in recent years, our subscription rate remains unchanged. Secondly, the fragmentation of estates and the development of small holdings have led to a rise in the number of addresses on our free mailing list. The post-war years have also seen a drop in our overseas circulation.

Several works published by the Institute are now out of print and a completely revised list of available publications has been drawn up to meet the increasing frequent demand for particulars with regard to back numbers. A limited number of the two numbers of "Monographs on Tea Production in Ceylon" is still available.

Acknowledgments. As usual close co-operation has been maintained with the Ceylon Association in London, the Planters' Association of Ceylon, The Agency Section of the Planters' Association of Ceylon, various Agency Houses, and Engineering Firms and the other bodies concerned with the Tea Industry.

The grateful thanks of the Board are due to all of them for their continued interest and assistance in the working of the Institute. Thanks are also due to the Planters' Association of Ceylon for the readiness with which their room was placed at the disposal of the Board for meetings of the Board and its Committees.

Accounts. Messrs. Ford, Rhodes, Thornton & Co. continued to act as Auditors. The audited statement of accounts and the Balance Sheet for 1951 follow this report as do also the reports on St. Coombs Estate, and those of the Director and Scientific Staff.

J. LAMB
Secretary

Tea Research Institute of Ceylon,
St. Coombs,
Talawakelle.
November, 3rd 1952.

THE TEA RESEARCH INSTITUTE OF CEYLON

ESTATE WORKING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1951

Statement (b)

1950 Rs.	EXPENDITURE	Rs. Cts.	Rs. Cts.	1950 Rs.	INCOME		Rs. Cts.	Rs. Cts.
	ESTATE EXPENDITURE — REVENUE :—				TEA SALES :—			
92,245	General Charges	107,214.68			TEA SALES :—Gross Proceeds :—			
70,755	Upkeep	98,240.15		328,613	Colombo	254,687 lbs.	509,388.44	
50,075	Cultivation	41,390.85		2,337	Local	1,446 ,,	3,019.78	
62,821	Harvesting	101,994.72		3,098	Broken Mixed	7,399 ,,	3,583.45	
64,538	Manufacture	96,196.65	445,037.05	422	Bio Department	190 ,,	401.28	
				—	Gratis	1,424 ,,	—	
340,434						265,146		516,392.95
4,708	Colombo Brokerage & Handling Charges		7,640.75	334,470				
2,407	Motor Road Roller — Loss on Working				MOTOR ROAD ROLLER — Profit on working			199.94
—	Balance carried down		63,915.09	—				
				13,079	Balance carried down			—
Rs. 347,549			Rs. 516,592.89	Rs. 347,549				Rs. 516,592.89

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1951

Statement (c)

1950 Rs.		Rs. Cts.	Rs. Cts.	1950 Rs.		Rs. Cts.	Rs. Cts.
	ADMINISTRATION OF THE BOARD :—			13,079	Balance brought down		63,915.09
240	Planters' Association of Ceylon	240.00			Tea Cess	808,024.50	
5,559	Travelling of the Board	4,683.80		743,330	*Less :* Credited to Smallholdings Advisory Service	47,404.66	760,619.84
19,558	Clerical Staff-Salaries	26,234.57					
1,699	Telephone Operators	1,636.67					
1,437	Office Peon	1,732.65		6,570	Interest		6,578.06
1,039	Postages	825.13		600	Rent of Caddy		600.00
2,487	Stationery	3,171.49		173	Guest House Account		199.75
510	Advertising	29.20					
1,518	Telegrams, Trunk Calls	1,260.11					
200	Printing	—					
293	Legal Expenses	—					
1,679	Auditors' Fees and Expenses	2,480.10					
273	Contingencies	322.00					
10,123	Dearness Allowance	15,170.54					
—	Administrative Secretary	180.00					
46,615	— Cooly Allownace	596.14	58,562.40				
c/F 46,615	Carried forward		58,562.40	737,594	Carried forward		Rs. 831,912.74

THE TEA RESEARCH INSTITUTE OF CEYLON

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1951—(*contd.*)

1950 Rs.			Rs. cts.	Rs. cts.	1950 Rs.		Rs. cts.
B/f 46,615		Brought forward		58,562.40	B/f 737,594	Brought forward	831,912.74
		PERSONAL EMOLUMENTS OF SCIENTIFIC STAFF :—					
	27,828	Director	29,641.66				
	—	Director's Peon Allowance	325.00				
	—	Allowance to Acting Director	2,400.00				
	—	Servant Allowance to Staff	4,819.79				
	20,564	Plant Physiologist	21,000.00				
	6,129	Agricultural Chemist	16,080.21				
	12,100	Scientific Officer	12,700.00				
	10,050	Pathologist	6,238.33				
	11,467	Bio-Chemist	—				
	—	Assistant Pathologist	13,880.17				
	4,142	Proportion of Superintendent's Salary	4,248.39				
	27,065	Dearness Allowance	27,688.60				
	750	Deputy Director's Allowance	1,800.00				
	1,250	T. E. Walter—Car & Special Allowances	3,660.00				
	—	Tea Technologist	2,584.00				
130,659	9,314	Dr. C. H. Gadd's Salary	—	147,066.15			
		EMOLUMENTS — JUNIOR AND SUB-SCIENTIFIC STAFF :—					
	67,260	Junior Scientific Staff	65,809.33				
	9,837	Laboratory Attendants & Fieldman	10,674.56				
105,076	27,979	Dearness Allowance	36,198.96	112,682.85			
c/f 282,350		Carried forward		Rs. 318,311.40	c/f 737,594	Carried forward	Rs. 831,912.74

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1951—(*contd.*)

1950 Rs.			Rs. Cts.	Rs. Cts.	1950 Rs.		Rs. Cts.
B/f 282,350		Brought forward		318,311.40	B/f 737,594	Brought forward	831,912.74
		LABORATORY :—					
	10,847	Equipment and General Working Expenses	7,347.92				
10,921	74	Furniture and Office Equipment	26.00	7,373.92			
		LIBRARY AND PUBLICATIONS					
	4,661	Library	4,915.38				
		Publications 12,329.08					
6,737	2,076	*Less :* Receipts from Advertisements 4,500.00	7,829.08	12,744.46			
		SMALL HOLDINGS ADVISORY SERVICE :—					
		Working Expenses for the Year	53,336.31				
33,380		*Less :* Charged against Special Account	5,226.31	48,110.00			
		FIELD AND FACTORY EXPERIMENTS					
	4,761	Agricultural Chemist	9,375.61				
	8,194	Plant Physiologist	7,628.75				
	895	Miscellaneous Field Experiments	3,263.33				
20,341	6,491	Factory Experiments	5,662.66	25,930.35			
		TRAVELLING OF STAFF :—					
	7,006	Officers Expenses	5,915.54				
	542	Insurance of Car and Licence	692.23				
	1,932	Drivers Wages	1,968.00				
	872	Drivers Batta	979.75				
	9,447	Running Expenses and Repairs	9,541.75				
21,741	1,942	Dearness Allowance	2,110.50	21,207.77			
c/F 375,470		Carried forward	Rs. 433,677.90		c/F 737,594	Carried forward	Rs. 831,912.74

THE TEA RESEARCH INSTITUTE OF CEYLON

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1951—(*contd.*)

1950 Rs.			Rs. Cts.	Rs. Cts.
B/f 375,470		Brought forward		443,677.90
		MAINTENANCE OF BUILDINGS		
	1,697	Laboratory	1,120.98	
	4,464	Senior Staff Bungalows	4,101.07	
	2,359	Junior Staff Bungalows	4,882.54	
	302	Clerks Bungalows	1,242.97	
	596	Miscellaneous Lines and Buildings	1,845.55	
	220	Passara Buildings	182.20	
9,721	83	Guest House	112.79	13,488.10
		GENERAL SERVICES :—		
	16,992	Electric Power	19,181.22	
	1,820	Mechanic	2,175.00	
	842	Telephone Rent and Maintenance of Lines	879.62	
	1,871	Roads	828.27	
	2,038	Sanitation	3,795.30	
	2,130	Water Supply	2,303.11	
	740	Tappal Lorry and Book Fees	765.70	
	12	Drains	75.21	
	4,198	Upkeep of Grounds	2,536.31	
	995	Guest House	1,178.22	
	750	Storekeeper's Salary	780.00	
42,194	9,806	Dearness Allowance	11,190.63	45,688.59
		MISCELLANEOUS :—		
	510	Incidental	554.66	
	14,021	Provident Fund—Senior Scientific Staff	16,008.85	
	13,150	Provident Fund—Junior Scientific Staff	12,178.70	
	4,665	Provident Fund—Sub. Staff	6,261.33	
	32,346	Carried forward	35,003.54	
B/F 427,385		Carried forward		Rs. 492,854.59

1950 Rs.		Rs. cts.
B/f 737,594	Brought forward	831,912.74
Rs. 737,594	Carried forward	Rs 831,912.74

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1951—(*contd.*)

1950 Rs.			Rs. Cts.	Rs. Cts.	1950 Rs.
427,385		Brought forward		492,854.59	B/f 737,594
		MISCELLANEOUS :—(*continued*)			
	32,346	Brought forward	35,003.54		
	15,000	Passage Provision	29,940.00		
	775	Ceylon Nursing Association, Fraser Nursing Home and Medical Expenses Reimbursed	4,448.97		
	1,189	Medical Fees—Sub. Staff	846.65		
	2,344	Medical Scheme—Junior Staff	2,185.00		
	6,437	Insurances	6,856.96		
	2,173	Watchman and Caretakers	3,051.70		
	4,000	Conference Expenses	—		
	600	Observatory Allowance	600.00		
	—	Holiday Warrants—Junior & Sub. Staff	2,307.50		
	970	Proportion of Superintendents' Furlough and Passage	1,660.00		
	200	Junior Staff Association	200.00		
	1,945	Dearness Allowance	1,507.84		
95,579	27,600	Additional Contribution to Provident Fund	—	88,608.16	
6,138		LOW COUNTRY SUB STATION :—		14,390.28	
13,684		GOVERNMENT OF CEYLON LOAN INTEREST :—		10,293.88	
49,006		DEPRECIATION :—		54,259.25	
145,802		Balance being excess of Income over Expenditure for the year ended 31st December, 1951	—	171,506.58	
Rs. 737,594			Rs. 831,912.74	Rs. 737,594	

	Rs. cts.
Brought forward	Rs. 831,912.74
	Rs. 831,912.74

THE TEA RESEARCH INSTITUTE OF CEYLON

BALANCE SHEET AS AT 31st DECEMBER, 1951

1950 Rs.			Rs. Cts.	Rs. Cts.	1950 Rs.
		Loan Account :—			
		Loan from Government of Ceylon	1,000,000.00		
203,199		*Less :* Repayments to 31st December, 1951	860,940.99	139,059.01	
		Creditors and Provision :—			
		Creditors :			
	2,794	Accrued interest on Loan	1,912.06		2,711,548
	35,933	Sundry Creditors—Estate	40,996.23		
	41,621	Sundry Creditors—Research	81,890.18		
	69	Subscriptions for Publications (received in advance)	65.20		
	301	Contributions for Cart Road (received in advance)	301.00		
	—	Building Contractor	8,084.64	133,249.31	
	80,718				
		Provision for furlough Passages :—			
		As at 31st December, 1950	24,213.39		
		Additions during 1951	36,748.98		216,875
			60,962.37		
104,931	24,213	*Less :* Payments in 1951	11,691.19	49,271.18	182,520.49
		Blister Blight Account :—			
		Contributions received from Tea Controller		300,000.00	
		Less : expenditure :—			
		Capital account to 31.12.51.	114,746.72		
1,439		Revenue account ,, -do-	151,858.60	266,605.32	33,394.68
		Small Holdings Advisory Service :—			
		Appropriation from Tea Cess Account		47,404.66	
		Less : Expenditure in 1951 —			
		Capital	3,340.00		
		Revenue	53,336.31		
			56,676.31		
		Less : Charged to Income and Expenditure Account	48,110.00	8,566.31	38,838.35

		Rs. Cts.	Rs. Cts.
	Fixed Assets :—		
	Balance as at 31st December, 1950	2,711,548.35	
	Additions in 1951	226,349.98	
		2,937,898.33	
	Less : Scrapped and Sold in 1951	14,015.79	2,923,882.54
	Investments at Cost :—		
	Rs. 20,000/- 3¼% Cey. Govt. National Loan 1956	20,000.00	
	Rs. 30,000/- 3½% Cey. Govt. Loan 1957/62	29,512.50	
	Rs. 15,000/- 3 % Cey. Govt. Defence Bonds 1952	15,000.00	
	£ 2,300/- 3½% War Loan	32,434.76	
	£ 6,750/- 2½% Nat. War Bonds 1952/54	90,000.00	
	£ 2,063.18.1. 4% Funding Loan 1960/90	29,928.06	
	(Market Value approx. Rs. 207,687/–)		216,875.32
	Current Assets :—		
	Debtors :		
	Principal Collector of Customs 71,643.09		
	Advertisement Receipts 2,840.00		
	Junior Staff Association 137.63		
	Shell Co., of Ceylon Ltd. 2,297.96		
	George Steuart & Co., balance due on Cart Road — 1951 150.00		
	Lindoola – Road Upkeep Contribution 1951 250.00		
	St. Coombs Co-operative Stores 2,006.55		
66,945	Sundries 964.18	80,289.41	
	Debtors — Research :—		
	Ceylon Association in London (£ 188 - 3 - 5) 2,508.95		
	Research Staff 12,487.68		
	Sundries 715.95		
	Accrued Interest on Investments 1,600.75		
	Sundries — Estate 10,168.91		
	Debt Settlement Account 2,346.34		
12,681	Colombo Plan Exhibition 1,675.10	31,503.68	

THE TEA RESEARCH INSTITUTE OF CEYLON

BALANCE SHEET AS AT 31st DECEMBER, 1951—*contd.*

1950 Rs.		Rs. cts.	Rs. cts.	1950 Rs.			Rs. cts.	Rs. cts.
306,691	Brought forward	383,812.53	2,928,423	79,626		Brought forward	111,793.09	3,140,757.86
	DEPRECIATION PROVISION :—					STOCKS :—		
	At 31st December, 1950	750,350.97				General	17,389.90	
	Additions during 1951	54,259.25				Electrical	4,448.99	
		804,610.22				Tea 40,241 lb. (at prices since realised)	75,792.72	
750,351	*Less :* Loss on Items sold in 1951	1,850.00	802,760.22			ESTATE :—		
						Foodstuffs 4,215.90		
	SURPLUS ACCOUNT :—				66,389	Packing Materials etc., 5,009.70	9,225.60	106,857.21
	Balance as at 31st December, 1950	2,190,427.62						
2,190,428	*Add :* Excess of Income over Expenditure in 1951	171,506.58	2,361,934.20			CASH :—		
						On Current Account at National Bank of India, Ltd., Colombo	160,668.80	
						Petty Cash	170.94	
						Imprest Account	11.63	
						Postal Franker Account	242.07	
						ESTATE :—		
						National Bank of India, Ltd., Colombo	27,900.88	
						In hand	4,185.95	
						Low Country Sub-Station – in hand	411.33	
						Small Holdings Advisory Service —		
				319,047	173,032	in hands of Small Holdings Officer	5,507.19	199,098.79	417,749.09
Rs.3,247,470			Rs. 3,558,506.95	Rs.3,247,470					Rs. 3,558,506.95

We have examined the above balance sheet with the books of the Tea Research Institute of Ceylon and St. Coombs Estate and have obtained all the information and explanations we have required. Expenditure on blister blight account and on small holdings advisory service account, whether capital or revenue, has been charged to expense account on the instructions of the director. Subject to these remarks, in our opinion the foregoing balance sheet is properly drawn up so as to exhibit a true and correct view of the financial affairs of the Institute as at 31st December, 1951, according to the best of our information and the explanations given to us and as shown by the books.

Colombo, 22nd September, 1952.

(Signed) FORD, RHODES, THORNTON & Co.,
Chartered Accountants.

THE TEA RESEARCH INSTITUTE OF CEYLON

CAPITAL EXPENDITURE ACCOUNT AS AT 31st DECEMBER, 1951

	As at 31–12–50	Additions in 1951	Items Scrapped and Sold	As at 31–12–51
	Rs. Cts.	Rs. Cts.	Rs. Cts.	Rs. Cts.
To Land Including Development ..	956,909.96	21,168.16	——	978,078.12
„ Buildings and Lines ..	1,349,617.30	89,582.40	5,000.00	1,434,199.70
„ Furniture and Equipment ..	114,933.16	6,636.84	165.79	121,404.21
„ Laboratory Equipment ..	54,766 81	7,144.81	——	61,911.62
„ Experimental Machinery ..	35,529.84	3,804.25	——	39,334.09
„ Motor Road Roller ..	7,386.03	——	——	7,386.03
„ Motor Car ..	8,850.00	9,995.00	8,850.00	9,995.00
„ Machinery — Estate ..	163,905.90	——	——	163,905.90
„ Hoist ..	2,055.38	——	——	2,055.38
„ Station Wagon ..	11,500.00	——	——	11,500.00
„ Atco Motor Mower ..	650.00	——	——	650.00
„ Low-Country Sub-Station ..	2,909.20	78,018.52	——	80,927.72
„ Grubber ..	2,534.77	——	——	2,534.77
„ Small Holdings Advisory Service — Land Rover	——	10,000.00	——	10,000.00
	Rs. 2,711,548.35	Rs. 226,349.98	Rs. 14,015.79	Rs. 2,923,882.54

REPORT ON ST. COOMBS ESTATE FOR THE YEAR 1951

Staff. Mr. F. C. Daniel returned from leave and took up his duties again in May, 1951.

The Assistant Clerk left of his own wish in November and a successor was appointed.

Acreage.

	A.	R.	P.
Tea in bearing ...	286	2	28
New Clearing	4	2	00
Green manuring clearing	12	0	00
Land fit to open in tea ...	15	3	00
Buildings & Gardens ...	46	0	11
Grass land & Ravines ...	32	0	24
Fuel Clearings	36	3	14
TOTAL	423	3	37

Weather. (Estate Gauge).

	Rainfall Inches	Wet days	Sunshine hours
Registered in 1951 ...	108.17	246	1939
Registered in 1950 ...	76.31 ...	224	1785
Average	93.25 ...	234	

After the preceeding long period of climatic conditions which were not favourable to good quick growth, it was indeed a pleasure to experience a year of suitable tea growing conditions.

Crop.

	1951 lbs.	1950 lbs.
Estimate	220,000	220,000
Total Crop (including Broken mixed) ...	265,146	151,291
Yield per acre on 286 acres	925	528

Yield per Acre. The enormous increase over last year and previous years is a phenomenon. This is attributed to—

1. Manurial applications.
2. Climatic conditions.
3. Anti-blister blight spraying.
4. Spread of bushes (lighter pruning).

The highest yielding field gave 1272 lbs. per acre and was in its third year from pruning.

Prices & Total Crop Sold.

Year	Total Crop lbs.	Gross Price cents	Nett price cents
1951 ...	263,728	... 195.81	... 192.91
1950 ...	149,883	... 223.15	... 220.79

Teas generally were reported on favourably during the year.

Cost of Production.

	1951 Cost per lb.	1950 Cost per lb.
Estimate	197.64	159.01
Actual	167.84	225.02

Dearness allowance included in the above was—

	1951	1950
Senior & Subordinate Staff ...	5.90	8.87
Factory Staff...	1.80	2.45
Factory Labour	3.27	4.00
Other Labour	35.11	57.03
	46.08	72.35

Profit on Estate Working.

1951	...	Profit ...	Rs. 63,915/-
1950	...	Loss ...	Rs. 13,078/-

The average annual profit from the estate working (1929 to 1951 inclusive) is Rs. 45,750/- per annum so the profit for 1951 is some Rs. 18,165/- above the average.

Capital Expenditure.

1951	...	Rs. 29,145	...	10.99 cts. per lb.
1950	...	Rs. 37,089	...	24.52 cts. per lb.

The expenditure here was—

Commencement of factory rewiring.
Extension of internal cart road.
Blister Blight. Initial water supply arrangements.
Extensions to buildings.
Furniture for the assistant's quarters.
Water supply to Nos. 4 and 5 lines.

Plucking. The standard of plucking improved. Individual row plucking was inaugurated in two fields, but when really heavy flushes were experienced, and it was absolutely necessary to adhere to regular plucking rounds to co-ordinate with anti-blister blight spraying rounds, this had to be discontinued. Mechanical plucking in 2¼ acres commenced again when the acreage recovered from pruning. A hard plucking experiment commenced in No. 2 Field, approximately half the field being plucked to the fish leaf, for a period, without any spray protection against blister blight, and then rested and re-tipped and hard-plucked again, while the rest of the field received spray protection and is plucked normally.

Pests and Diseases. Early in the year fields recovering from pruning became infected with blister blight and some spray protection was given. On 1st May regular spraying of the whole of the estate commenced and was continued to December, 18th. The tea benefitted from this tremendously, as it was the first time that some fields had any protection at all. 1951 cannot be said to have been a bad year for blister blight infection.

Soil Improvement. In the second half of the year, after No. 6 field had been pruned, approximately half of the field had pits cut in it, one to every four bushes in alternate rows, and they were filled with the leaves from the prunings and compost. The balance was forked and then thatched with Gautemala grass at the rate of 15 tons to the acre. The areas were similar and the leaf is to be weighed separately in order to get some idea as to whether there will be any noticeable difference in yields, and improvement in the bushes.

Artificial Manure Applications. Following are details of Nitrogen and Potash applied to individual fields for three years. The Phosporic Acid figures are not shown. Forking was generally of the envelope forking type. Application appears irregular, but interested readers should remember that during 1951 we were not working fully on the 6 monthly applications with amounts based on crop harvested.

		1949			1950			1951	
			Nit.	Pot.		Nit.	Pot.	Nit.	Pot.
No. 1	Sept.	50	27	May	55	36	May	35	19
							Oct.	55	30
No. 2	April	45	24	May	40	21	April	35	19
	Dec.	60	36						
No. 3	April	45	24	Jan.	60	36	April	35	19
				June	40	22	Sept.	55	30
No. 4	July	30	16	March	55	30	May	40	23
				Dec.	65	36			
No. 5	July	60	32	April	35	19	Aug.	65	35
				Dec.	55	30			
No. 6	April	45	24	June	40	22			
	Dec.	60	36						
No. 7	Aug.	60	36	May	35	19	Sept.	65	35
				Dec.	55	30			
No. 8	July	60	36	April	35	19	April	40	23
				Dec.	55	30	Sept.	65	35
No. 9	Aug.	30	16	Feb.	55	30	June	40	23
				Nov.	65	36	Nov.	40	25
No. 10	Feb.	50	27	May	65	36	April	40	23
							Nov.	40	23
No. 11	April	45	17	Jan.	60	36	Feb.	40	23
				Jun.	40	22			
No. 12				March	35	19	July	65	35
				Dec.	55	30			
No. 13				Feb.	35	19	July	65	35
				Dec.	65	30			
No. 14A.	May	35	19	Jan.	80	44	April	35	19
				Aug.	60	33	Oct.	55	30
No. 14B.	May	35	19	Jan.	85	53	April	35	19
				Aug.	60	33	Oct.	55	30

When showing similar figures in the report for 1950, I commented that "future yield increase may be expected". This has been fully realised.

Green Manures. Grevilleas and Albizzia Moluccana plants put out, have been slow to take root and growth, but especially in No. 2 field, began showing above the tea bushes. All available material was put to re-supplying fields done in 1950 and the balance were utilized to supply other fields.

Guatemala grass was put out in some netti-kans, and in the manna grass area at the back of the Guest House, and the main area has been transplanted. The old bird santuary areas have also been supplied up with it in contour, as has the gum clearing between fields Nos. 4 and 11. Artificial manure has been applied to the grass where it has sufficient leaf on.

A number of Tecoma plants were put out in fields 2, 3, 6, 11 and 12.

Pruning. As protection measures were taken against the incidence of blister blight, some fields were pruned in the South west Monsoon, but were pruned lightly leaving all wood. Work was done on the slope system and was very satisfactory in that the slope was obtained (not fully on all bushes) without cutting into the previous cycles wood. The growth of wood found was possibly on the smallish side, which was to be expected in the fields concerned.

Re-planting of Old Tea. Lopping of Guatemala grass in the No. 10 field areas was done regularly until June, when in approximately two acres, the grass was cut low to kill it out. Approximately 80% died back after the low cut, but the balance persisted in putting out shoots and was finally killed out by being hacked off with mamoties. The balance continued to be regularly lopped.

After the final loppings from the killed back area had commenced to break down, the contour trenches were filled in with earth from the lower side, and the terraces were formed. Along the edge of these an endeavour was made to establish Crotalaria Striata, but although put out twice it came away very badly. Grevillea and Albizzia Moluccana were also put out but those that survived made little or no growth.

After a petrol driven Grubber had been obtained from Australia work commenced rooting out the old tea in No. 1 field, after which contours were put in and a commencement made cutting trenches.

Again while pulling out the bushes the absence of large tap roots was noticeable.

Mossing and Ferning. The advent of lighter pruning, leaving all available wood in the centre of the bushes, makes the hand removal of fern, moss and bamboo-grass increasingly difficult and very expensive. An endeavour is made to remove fern and grass by hand, but in the fields pruned in the second half of the year we have gone back to the old method of whitewashing the bushes. I consider it effective and beneficial. The application is done with the anti-blister blight equipment using larger nozzles.

Weeding. The decision to clean weed was implemented during the year, and the property took on a very welcome "new look", while morale consequently soared. At the end of the year weeding contracts to the extent of over two thirds of the acreage of tea in bearing had been arranged.

Factory and Machinery. Machinery was maintained in good order, but the factory showed signs of needing renovations. It is impracticable to do this until it has been re-roofed.

Labour. To complete the programme of work estimated and at the same time to supply labour for the Institute's experimental work, resident labour was quite inadequate. Sinhalese were taken into all available line accommodation and I was greatly indebted to Mattakelle and Boombagastalawa Estates for the loan of any spare labour they had, while at the same time our resident labour was given work on contract, to be done in the evenings. By these means I was able to complete the programme and keep weeds well under control.

General. St. Coombs estate is now showing the benefit derived from protection against blister blight, the effects of pruning for spread over the last two cycles, incremental manure applications, and clean weeding. The tea has a healthy appearance and the Estate has never looked better or yielded so well.

In conclusion I wish to thank Mr. Bruce Gibbon for carrying on so ably during my absence on leave.

F. C. DANIEL
Superintendent.

METEOROLOGICAL OBSERVATIONS, 1951.

ST. COOMBS.

(Laboratory Gauges)

MONTH	TEMPERATURES							RAINFALL		RAINY DAYS		SUNSHINE	
	Mean Maximum	Difference from average (20 years)	Mean Minimum	Difference from average (20 years)	Adopted Mean	Mean on Grass	Mean Relative Humidity	Inches	Difference from average (20 years)	Days	Difference from average (20 years)	Hours	Difference from average (20 years)
January	73.5	— 0.8	57.0	+ 1.7	65.2	55.7	76	8.35	+ 5.21	21	+ 12	108.15	— 96.24
February	75.3	— 1.2	53.0	— 1.4	64.2	49.2	56	2.99	+ 0.85	9	+ 2	199.83	— 19.22
March	77.6	— 0.2	55.9	+ 0.6	66.8	50.5	68	4.26	— 0.19	14	+ 2	225.72	— 8.89
April	77.6	0	57.3	— 0.5	67.4	54.7	78	4.37	— 1.95	14	— 2	191.20	— 13.13
May	78.1	+ 6.4	58.8	— 0.9	68.4	56.9	78	4.82	— 6.86	17	— 2	213.55	+ 48.67
June	67.2	— 3.6	60.3	— 0.1	63.8	61.1	92	33.25	+21.31	29	+ 3	38.73	— 58.20
July	70.3	+ 0.2	59.4	— 0.1	64.8	58.7	87	11.16	— 0.93	23	— 3	89.63	— 17.73
August	73.9	+ 3.0	58.6	— 0.6	66.2	59.2	81	2.71	— 7.18	19	— 6	186.12	+ 73.19
September	73.7	+ 1.6	58.2	— 0.1	66.0	56.8	83	13.29	+ 5.04	24	+ 3	167.50	+ 29.11
October	73.9	+ 0.6	57.8	+ 0.1	65.8	56.5	82	8.46	— 1.07	23	+ 1	190.80	+ 38.89
November	73.8	+ 0.2	57.8	+ 0.5	65.8	52.4	84	11.08	+ 3.36	19	— 1	142.63	— 16.65
December	74.0	+ 0.5	55.2	— 0.9	64.6	53.1	77	1.92	— 3.59	12	— 3	185.07	+ 16.04
	74.1	+ 6.7	57.4	— 1.7	65.8	55.4	78	106.66	+14.00	224	+ 6	1938.93	— 24.16
	Means							Totals					

REPORT OF THE DIRECTOR OF THE TEA RESEARCH INSTITUTE OF CEYLON FOR 1951

The report of the Director as Secretary to the Board of Control, together with the reports of the staff which follow, cover the activities of the Institute in 1951 quite adequately. There is little point in abstracting these reports solely for the purpose of producing a separate Director's report, but itis, however incumbent on the Director to give some sense of perspective by drawing special attention to certain parts of the report.

Particular attention is drawn to the expansion of extension services in the form of the new Low-Country Sub-Station and the enlarged Small Holdings Advisory Service. It is hoped that Low-Country producers will take the maximum advantage of the new facilities provided for them. The new Low-Country Sub-Station is, in fact, more than an extension service for, together with the Passara Sub-Station, it completes a network (albeit a net of wide mesh and thin strands) of experimental facilities covering the whole of the tea producing areas. The comparatively new Engineering Department also continued to consolidate and has already proved a valuable addition to the establishment.

The year 1951 was, therefore, a period of expansion and attention should be drawn to the fact that this expansion was the result of pressure to increase the scope of the services rendered by the Institute. The initiative for the expansion of activities has definitely not come from within the Institute, and there has, in fact, been some reluctance to embark upon these new ventures.

It is very gratifying that there should be a demand for larger extension services, but the provision of such services creates considerable financial problems, and while costs continue to rise there must be anxiety about the Institute's financial resources. Future policy must be confined to consolidation and to making the best possible use of the facilities now available.

During leave in the United Kingdom from June to November a most interesting and well organised International Agricultural Conference, arranged by Plant Protection, Ltd., was attended. Two addresses were also given to the Ceylon Association in London on various aspects of the work of the Institute.

J. LAMB
Director.

REPORT OF THE CHEMICAL DIVISION FOR THE YEAR 1951

AGRICULTURAL CHEMISTRY

Dr. F. Haworth reports as follows:—

Minor element nutrition of the tea bush. Experiments were laid down on three estates during the year to determine whether any response could be obtained by the application of minor element solutions, in the form of sprays, to tea foliage. No responses have, as yet, been obtained.

It should be pointed out that although there is considerable evidence of a boron deficiency in cauliflowers in some upcountry areas there is no evidence to suggest that trace elements are in fact limiting so far as the tea bush is concerned. This work is being continued and extended to include other representative areas. It may become of importance in the future in replanted areas where high yielding clones are used.

Investigation into the base status of soils. An investigation into the present base status of soils from the plots of the three main factorial manurial experiment was initiated. This manurial experiment has been in progress for almost 20 years and some of the treatments are such that growth is being very much retarded and some bushes are dying. The analysis of the exchangeable bases from the soils from these areas should provide interesting and useful information.

Many areas of tea were in poor condition in 1947 due to shortage of manures during the war period and a tendency to overpluck the bushes to supply the large demands for tea. With the advent of blister blight many of these areas deteriorated still further and a determined effort is being made to bring them back to full health and production.

For the purpose of building up the soil in these areas large quantities of organic matter are required and the growing of grasses especially Gautemala grass in ravines and on waste areas to provide mulching materials has been strongly advocated. The use of mulches is of great value in areas of poor tea where much soil is exposed, for not only does the organic matter become incorporated into the soil but the presence of a surface mulch does much to minimize the harmful effects of insolation on the soil and also to a large measure prevents loss of top soil during the heavy monsoonal rains.

However, Gautemala grass is a gross feeder and must be adequately manured if it is to yield highly.

Little is known concerning the manurial requirements of grasses on typical Ceylon tea soils so that a large replicated experiment was laid down during the year to attempt to determine the optimum manurial treatment for Gautemala grass.

A smaller experiment was also started to determine the response of the patana grasslands to manuring for, on those estates which have large areas of patana land available, it may be more economical to use the existing grass areas rather than to plant Guatemala grass since the latter operation is expensive.

In the latter part of the year several tea bushes complete with roots were taken out on St. Coombs and other estates by washing away the soil with low and high pressure water jets. Very interesting facts were emerged from this work. Firstly, the larger part of the finer root system of the tea bush is confined to the top six inches of soil even under conditions of intense deep cultivation and in a friable well structured soil. Secondly, the great water stability of the upland red humic latosolic soils was very forcibly brought out, for at a depth of a few inches it was virtually impossible to wash away any soil using a 3/4" hose pipe at a pressure of about 30 lbs. per square inch. The process still was slow, tedious, using a 1/8" jet at 200 lbs. per square inch. That is not to say that the upland soils are non-erodible, but it would appear that under reasonable management erosion losses should be very small. The detailed findings will be published elsewhere.

Over 3,000 samples of made tea and green leaf were analysed for copper content during the year in connection with the use of copper fungicides in the control of blister blight.

The apparatus necessary for large scale analyses of leaf samples using micro-methods was assembled during the year and a start will be made with this work in early 1952.

In co-operation with other departments an experiment to test the distribution of available proprietary dust formulations of copper fungicides was carried out. Full details are published in the *Tea Quarterly*, Vol. XXII Part III, Page 118.

General. Routine analyses of nursery soils for pH and physical suitability were continued. Whilst the department is only too willing to assist in this type of advisory work the number of samples is rapidly increasing and it is becoming more difficult for reports to be sent promptly. It should be possible for the large estates to use a simple soil pH outfit of which several are on the market and thus help to relieve the pressure to some extent.

BIOCHEMISTRY

Mr. M. S. Ramaswamy reports as follows:—

Oxygen absorption experiments conducted to study the effect of pectase on polyphenol oxidase activity under *in vivo* conditions showed an inhibition of the oxygen uptake by the fermenting leaf when the material was subjected to an initial pectase action in CO_2 atmosphere. The results were indicated in the annual report for 1950. Special mention was made of the nature of this inhibition in the non-fermenting clone (No. 9) which is found to contain a high percentage of pectin and pectase. Even though it has been shown in an earlier work from this laboratory that the lack of enzymic copper in this particular clone is responsible for the low degree of fermentation observed, oxygen absorption experiments carried out after an initial pectase action have shown that, to some extent at least, initial pectase action causes the inhibition of normal fermentation.

With a view to confirming these results under *in vitro* conditions attempts were first made to separate the two enzymes as far as possible from each other. The usual methods for the preparation of purified polyphenol oxidase and

pectase, reported earlier from this laboratory were adopted with a few further modifications. A polyphenol oxidase preparation with a ratio[1] of 50 and a pectase preparation with a ratio of 6 were obtained.

Chromatography of the purified pectase preparation on a filter paper strip gave an R_F value at 0.88 - 0.89 for pectase and 0.22 - 0.23 for polyphenol oxidase. Attempts were made to complete the separation of the two enzymes using(*a*) a column of No. 1 filter paper disintegrated in a turmix mixer and (*b*) a column of precipitated tricalcium phosphate. But these trials were unsuccessful as, apart from the heavy loss of activity incurred, the two enzymes could not be freed from each other. Further trials are being made to separate the enzymes by the chromatographic technique.

A series of experiments were then conducted using both crude and purified enzyme preparations to determine the effect of pectase on polyphenol oxidase activity. The results obtained are indicated below.

(*a*) Simultaneous action of the two enzymes in their crude form on the substrate mixture exhibits a slight decrease in the polyphenol oxidase activity when compared with the polyphenol oxidase activity alone.

(*b*) Since methyl alcohol is formed as a product of hydrolysis of pectin by pectase, the effect of adding methyl alcohol to the enzyme substrate mixture as well as to the substrate mixture alone was determined. It was found to have no effect on the activity of polyphenol oxidase either in presence of ascorbic acid-catechol mixture or ascorbic acid alone. It was found to have no effect on the substrate in the absence of the enzymes.

(*c*) When an initial pectase action was effected by adding crude and purified enzyme preparations to the substrate mixture in an atmosphere of CO_2, polyphenol oxidase activity was found to be increased as compared to its activity in the absence of initial pectase action. These results are contrary to those obtained under *in vivo* conditions and may possibly be due to the entirely artificial conditions under which *in vitro* experiments are generally carried out.

Full details of the experiments will be published elsewhere.

In order to study further various properties of the highly purified pectase preparation, attempts were made to prepare and purify pectase from the non-fermenting clone (No. 9) which gives the highest pectase activity. A product was obtained which gave an activity 15,000 times greater than that in the green leaf. About 84 per cent. of the activity of this preparation was found to be destroyed when heated for 5 minutes at 70°C, while at 80°C and above, the enzyme lost all its activity[2]. When 10-30 microgrammes of the metals, manganese, copper, iron, magnesium, calcium, zinc, nickel, boron and cobalt were added to a mixture of 1.0 ml. of highly purified enzyme preparation plus 2 ml. of 1% pectin solution plus 2 ml. neutral phosphate buffer there was no effect upon the activity of the enzyme.

During the attempts made to prepare a highly active polyphenol oxidase for chromatographic work, an enzyme preparation about 2,000 times more active than that present in the green leaf was obtained. This preparation is more active than the one reported earlier from this laboratory.

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[1] Ratio of polyphenol oxidase activity expressed as microgrammes of ascorbic acid oxidised, to pectase activity expressed as microgrammes of methyl alcohol produced.

[2] Ramaswamy, M.S.—Studies on the Fermentation of Ceylon Tea, Part 10: "Purification and Preparation of Tea Pectase."

(*In preparation*).

TECHNOLOGY

Mr. E. L. Keegel reports as follows:—

(1) **Advisory.**

(*a*) 35 visits were made to factories.

(*b*) 16 rolling programmes were drawn up in connection with these visits.

(2) **Epicyclic-pressure Rolling.** Reference to experiments carried out on this type of rolling was made in the last annual report. It was shown that provided a satisfactory circulation of leaf was maintained, the size of the crank of a roller was of little consequence. Nothing was to be gained by extra brisk circulation. These results were consistent with those obtained in early investigations on E.P. rolling when speeds of a standard size crank were compared over a wide range.

Circulation, it must be admitted, is difficult to standardize. Visual observation is the best method of judging the movement of leaf in a roller but even then it is a deceptive guide. For instance, if the speeds of two different size cranks are so adjusted as to give the same peripheral speeds the bigger crank though at a lower speed gives the impression that leaf is going round more briskly. In actual fact the movement is the same in both cases. It is therefore reasonable to assume that if dhool outturns are also made equal by a suitable adjustment in the size of the fitting used, there should be no difference in the teas produced from two disimilar size cranks. It was found, however, in the experiments done last year that this was not the case. This difference was at first thought to be due to the difference in the crank-throw but closer investigation revealed that the discrepancy in the results was caused by unequal pressure gaps. On making these equal the tea produced from the bigger crank were indistinguishable from those obtained from a smaller crank even when the speeds of the cranks were the same in both cases.

A further point that needed investigation and one of fundamental importance in E.P. rolling was the effect of degree of wither. Withers ranging from an exceptionally light one of 64% to a very hard one of 50% were experimented with. Comparisons were also made with Batten/Pressure cap rolling. No marked differences were observed but on the whole it may be concluded that E.P. rolling is less suitable for use with soft withers.

With the completion of these investigations the study of the technicalities of E.P. rolling can be regarded as concluded. Its application on a commercial scale has been thoroughly tested and there is now sufficient knowledge of the process to make its commercial adoption a success.

It must be pointed out, however, that E.P. rolling is primarily a method of saving machinery. No claim is made that it can produce better teas than Batten/Pressure cap rolling, but it can turn out as good a tea as made by traditional methods if only the fundamentals are grasped. The prejudice still existing in certain sections of the trade towards E.P. rolling can be traced to the haphazard experiments conducted in some estates where apparently the idea was to make the maximum amount of dhool in the minimum of time. In consequence leaf appearance suffered and a method that might have superseded Batten/Pressure cap rolling received a severe set back.

(3) **Batten/Pressure Cap Rolling.** The raising of the pressure cap at frequent and regular intervals during the roll is well recognised practice. The most familiar method of pressure application is 5 minutes on and 5 minutes off

in a 30 minute roll. The significance of this operation is not perhaps fully realized because if a roller is not overcharged, it is obvious that for half the duration of the roll, no work is being done on the leaf and no dhool being formed. The only apparent advantage is cooling of the leaf but actually the temperature does not fall as it is supposed to do. Careful records on both the commercial and experimental rollers of St. Coombs showed that temperature rise at the end of a 30 minite roll where pressure was applied in alternate 5 minute periods was the same as that registered at the end of a 15 minute roll during which the cap was not raised at all. It would appear, therefore, that the only benefit arising from the lifting of the pressure cap during a roll was the circulation and aeration of the leaf. If, however, leaf is properly circulating under pressure, admitting extra air into a roller by raising the pressure cap is not going to make much difference. Valuable time is lost by rolling without pressure for long periods, and if the same results could be obtained in half the time normally taken, a considerable saving in machinery would undoubtedly be obtained. The question was therefore considered to be one deserving investigation.

Only a few experiments were carried out but the results were so conclusive that it was not considered necessary to continue with further trials. As anticipated, Tasters were unable to find any significant difference between teas rolled continuously under pressure for 15 minutes and those produced from an orthodox 30 minute roll, in which pressure was also applied for the same total duration of 15 minutes but in alternate periods of 5 minutes each.

A curtailed roll of 15 minutes may be difficult to put into practice but a slightly longer roll, say 20 minutes, should be a satisfactory compromise. A factory short of rolling equipment might with advantage adopt short rolls and thus get over the difficulty of trying to keep driers fully loaded without overcharging of the rollers.

It might be of interest to record the dhool outturns obtained in the experiments referred to. The average for all the experiments is given in Table I.

Table I. *Effect of Continuous pressure on percentage dhool outturns.*

	15 minutes Continuous	30 Minutes (5 on 5 off)
Dhool 1	6	8
Dhool 2	12	12
Dhool 3	22	25
Dhool 4	41	41
Big Bulk	19	14

It will be noted that dhool outturns are almost equal. Extra pressure in the 15 minute rolls was not required to get this result except in the last rolls.

(4) **Effect of Composition of Pluck.** The results of this experiment were published in the *Tea Quarterly*, Vol. XXII Part III. The important part plucking intervals play in the standard of leaf harvested for manufacture is well known but our knowledge regarding the actual economic aspect is very scanty. An extensive attempt is therefore shortly to be made to supplement the available data on this all important question and a long term experiment is being planned to compare a 7 day round with a 14 day one.

(5) **Crop Protection Experiments.**

(a) **No. 2 Field.** Leaf from this experiment (referred to in the Pathologist's report) was manufactured on a few occasions. No difference of importance in liquoring characteristics was noted between the normal sprayed leaf and the fish plucked leaf but the made tea appearance of the latter was slightly better. This was to be expected on account of the fact that the shoot plucked to the fish leaf was taken at a younger stage. Further manufactures are to be done in 1952.

(b) **No. 8 Field.** Manufacture of leaf from each plucking round was continued until the middle of the year. Full results of the effect of spray residues on quality have been published in the *Tea Quarterly*, Vol. XXIII Part 1, page 2.

(c) **Miscellaneous.** Seven manufactures on different fungicides were carried out.

(6) **Leaf from Different Fields.** Further manufactures were done but the results were inconclusive. The wide differences in jat and age from pruning, not to mention the variability in the standard of leaf, made accurate comparisons impossible and no knowledge of value was gained.

(7) **Clonal Manufacture.** 160 manufactures of clones from St. Coombs and 14 estates were done on 24 separate occasions.

The increasing number of requests being received by the Institute from various estates is taxing the resources of the Technological section and it is hoped that the simple method described in the *Tea Quarterly*, Vol. XXIII Part IV will enable those estates that have undertaken clonal propagation and have so far not devised a manufacturing technique to carry out their own quality tests.

(8) **Withering Materials.** The high price of jutehessian and its short supply in the market in 1951 occasioned the trying out of alternative materials. Prolonged tests were carried out on two promising types of fabric, Tygan and Cotton Cloth.

(a) **Tygan.** This is a fabric composed of a plastic material (P.V.D.C.) that could be woven in a form convenient for use on withering tats.

The material used for the tests was 48″ wide with 14 perforations per inch. It can be easily stitched and this was the method adopted when fastening it to the tat wires.

Of all the withering materials tested by the Institute, Tygan appears to be the best. Unfortunately, its costs is about 4 times the price of hessian but because of its apparent durability, it might in the long run be cheaper. This remains to be proved, but judging from the condition of the material compared with hessian installed at the same time, there is every indication that it will have an infinitely longer life.

Other advantages it possesses over hessian are:—

1. It does not stretch.
2. Stripping of the leaf is quicker and easier.
3. It does not develop a fur like hessian.
4. It is non-inflammable.

The last is really the chief advantage in its favour and if by its use the risk of fire in withering lofts is expected to be materially reduced, a considerable

discount on fire premiums may be made by insurance companies in respect of factories where this material is installed.

A point worth noting in the tests conducted on Tygan is that the wither is not accelerated. No difference was found between Tygan and hessian in rate of wither, a result which is consistent with the results obtained from open weave types tested in the past. The claims often heard that tea made from leaf withered on a certain type of material is superior to that withered on another are without foundation in the light of the results of these tests and others made by the Institute on many types of withering materials. So long as a tat is maintained in a taut condition, there should be no difference of commercial importance in the teas produced after withering on different materials.

(b) **Cotton Cloth.** As far back as 1934 this material was tested for its suitability for withering tats. The material now marketed appears to be as durable as hessian but it possesses one main drawback in comparison with the latter, which is its tendency to stretch more than hessian.

In the case of hessian, retensioning is a simple matter owing to the ease with which eikels can be passed through it but cotton cloth on account of its closer weave makes this operation difficult. It was also found that eikels caused splitting after the cloth had been in use for some time. An alternative method of attachment to the tat wires is stitching but restitching the material each time the tat sagged was found to be laborious. This problem is now receiving the attention of the manufacturers and may be dealth with by the use of pointed galvanized wire nails, which would not damage the fabric. It is also proposed to lessen the tendency to stretch during use by stretching the material during its manufacture.

If these two problems can be overcome, cotton cloth may well prove useful.

(9) **Packing Materials.** Telecothene a commercial development of Polythene made its appearance in the form of a coated paper and the possibility of it taking the place of metal lining as a packing material was tested.

Telecothene coated paper was found to be quite suitable for the packing of tea. The paper backing that was used was quite rigid and strong and the coating so successfully carried out that there was no likelihood of its peeling off in normal commercial usage. It is completely moisture proof.

(10) **Stalk Extraction.** Numerous experiments were carried out on a machine called the Myddelton Stalk Extractor. The machine consists of aluminium sieves with bosses above the perforations. The oscillating motion imparted to the sieves is the same as that for an ordinary sifter and the bosses are designed to effect the separation of stalk from the tea.

In India, where it is held in high esteem, the Myddelton Stalk Extractor has done all that the makers have claimed for it. Results here have been most disappointing, however, and the main reason that can be attributed to its failure in separating stalk was that the stalk and tea were about the same size. There is every reason to believe that in the regions of India where this machine has given satisfaction, a type of stalk is produced which is more easily extracted. The quantity of stalk in an average Ceylon tea is less than that in certain Indian teas and this is probably another reason why the machine has been a success there and not here. Whatever the fact may be, the general conclusion is that little use can be found for it in most tea factories in Ceylon.

Acknowledgments. We once again record our thanks and appreciation to the Tea Tasters in Colombo and London who have continued to render valuable assistance in the tasting of our experimental teas.

REPORT OF THE PLANT PHYSIOLOGIST FOR THE YEAR 1951

Staff. During the Director's absence on leave from 1st June to 30th November, the Plant Physiologist also carried out duties as Acting Director.

Further demands on the Department's staff were also occasioned by the extensive programme of field experiments in connection with the control of blister blight which was in operation during the year. This necessitated Mr. E. S. Rajiah devoting almost the whole of his time to this work from May onwards and at the end of the year he was actually stationed on Ury Group, Passara, in chrage of the Mahapahagalla dusting experiment.

Correspondence. 497 letters were received and 448 despatched from the Department. In addition much advisory correspondence was dealt with by the Plant Physiologist from the Director's office.

General. 35 estate visits were made during the year and five Planters' Associations meetings attended. The Plant Physiologist also gave some of the lectures during the series of spraying courses for Superintendents held in four centres during April and May and at which other members of the staff acted as demonstrators. The Department was also largely responsible for the Institute's activities at the Nuwara Eliya and Gampola Agri-Horticultural Shows.

Soil Samples. Over 400 samples of soil were received, mainly from nursery sites, for pH determination and eelworm examination.

V.P. Nurseries. The main nursery, situated at the back of the Senior Staff bungalows, was found to be heavily infested with meadow eelworm (*Pratylenchus pratensis*) and is now being used to test clones for resistence to eelworm. 42 new clones, selected for blister blight resistence, have been planted in the area and it is hoped that some of these may also prove resistant to meadow eelworm.

A new nursery, free from meadow eelworm, has now been established just below the laboratories in No. 9 field and cuttings from 4 mother bushes have already been planted out. During the year 22 additional mother bushes were selected on St. Coombs for blister blight resistance. These will be propagated in the new nursery in 1952.

Prior to planting the new nursery was fumigated with Shell D.D. soil fumigant. This treatment not only reduces the eelworm population to an extremely low level but also frees the soil of insect pests such as cutworms, white grubs, etc. The fumigant is best applied with a special injection gun. These may be obtained on loan for short periods from the Shell Company.

1947 Clonal Area. The yields, for the 1st year in plucking, of some of the better clones together with other information obtained are shown in Table 1.

Table 1. *Yields, manufacture results and blister observations from* 19-6-50 *to* 4-6-51.

Position	Clone	No. of bushes plucked	Calculated yields per acre	MANUFACTURE				Blister observations
				No. of tests	Above average	Average	Below average	
T.201	2023	30	545	3	2	1	—	Between 1 & 2
T.232*	2023	16	345					„ 1 & 2
T.237	2023	19	645					„ 1 & 2
T.202*	2025	25	645	3	1	2	—	„ 1 & 2
T.212	2025	24	745					„ 0 & 1
T.216	2022	32	860	4	2	2	—	„ 1 & 2
T.226*	2022	20	480					„ 0 & 1
T.217	2021	8	810	4	4	—	—	„ 1 & 2
T.210*	2021	24	560					„ 1 & 2
T.218	2043	28	645	4	—	—	4	0
T.220	2016	33	810	4	1	2	1	„ 0 & 1
T.204*	2016	11	395					„ 1 & 2
T.223	2041	12	675	4	4	—	—	„ 1 & 2
T.231	2024	29	1240	6	5	1	—	„ 0 & 1

* Younger Plants
0 Disease absent
1 Few white blisters on leaves
2. Many white blisters on leaves
3. Many young stems damaged, but not killed throughout.

The highest yielding clone, 2024, gave a calculated yield of 1240 lbs. made tea per acre. The yield of this clone for the first six months of the second year (from 12/6/51 to 30/11/51) is 1090 lbs. per acre. Besides yielding well, 2024 has been found to be highly resistant to blister blight, produces good quality teas and is easy to root. In contrast the clone with the poorest yield gave only 165 lbs. per acre.

1043 would appear to be completely immune to blister blight. It is, however, a red leaf type which makes very poor teas, but should provide valuable material for investigating the physiological mechanism of resistance.

Blister Resistant Area. The clones planted in this area were selected primarily for blister resistance. Most have shown a considerable degree of resistance to blister blight, but it is doubtful whether many will be high yielding. These are to be brought into plucking in 1952.

Factors Affecting Propagation. (1) A few reports were received from estates that addition of Gammexane Dust D.025 at the rate of 2 teaspoonful per square yard prior to planting of cuttings led to poor rooting results. A trial with cuttings planted in soil treated with Gammexane as compared with untreated soil, however, gave no difference in rooting as is shown in Table 2 below.

Table II. *Effect of treatment with Gammexane. Percentage of cuttings rooted at* 11 *weeks.*

Plot	Untreated	Treated with Gammexane D.025
1	100	95.0
2	97.5	97.5
3	95	100
4	100	95
Mean	98.13	96.8

(2) Within reason the age of the shoot from which cuttings are taken appears to be immaterial as far as rooting is concerned. Cuttings taken from bushes where the shoots had been allowed to grow for 6, 12, 18 and 24 months showed almost no difference in rooting as can be seen from Table 3. Cuttings taken from shoots that have been allowed to grow longer than 12 months, however, show a marked tendency to develop flower buds. This merely denotes that in the stems from which the cuttings were taken flower bud initials had already been laid down. Cuttings should accordingly be taken before such initiation, for once laid down, a flower bud cannot normally change to a shoot.

Table III. *Effect of age of shoot. Percentage of cuttings rooted at the end of* 6 *months.*

	AGE FROM PRUNING			
	6 months	12 months	18 months	24 months
Clone A	94	82	72	74
B	54	70	74	50
C	60	48	56	66
Mean	69.3	66.7	67.3	63.3

Green Manures. *Crotalaria Grahamiana*, *C. Semperflorens* and *C. lanata* have all been badly attacked by caterpillars of the genus *Argina*. The foliage was often completely destroyed and in some cases the caterpillars had even stripped the bark. These Crotalaria species would therefore appear to be unsuitable for growing at this elevation on account of this disadvantage.

The following new species are being tried out on St. Coombs:—

Albizzia odoratissima
Desmodium distortum
Priotropis cytisoides
Indigofera teysmanii

together with a new kind of thornless Mimosa.

We are indebted to the Chief Scientific Officer, Tocklai Experimental Station and the Principal, School of Agriculture, Peradeniya, for green manure seeds supplied during the year.

Weed Killers. Several new types of chemical weed killers were received during the year as under :—

(1) Trichloracetate (TCA). This is normally formulated as either Sodium or Ammonium trichloracetate. A sample of the ammonium compound has been supplied by Imperial Chemical Industries (Export) Limited.

(2) Isoprophyl N-Phenyl carbamate (IPC). Formulations of 5% IPC dust, 50% IPC wettable powder and 10% IPC dispersible liquid have been supplied by Imperial Chemical Industries (Export) Limited.

(3) Pentachlorophenol. This is insoluble in water and has to be formulated as an oil concentrate which can then be emulsified with water for application (*e.g.* "Kanex"—Imperial Chemical Industries (Export) Ltd.) The sodium salt of pentachlorophenol is, however, sufficiently soluble in water to be used as a plain aqueous solution, (*e.g.* "Santobrite"—Monsanto Chemical Company).

Both the TCA and IPC compounds have been developed to give selective action against grasses and there is thus some likelihood that it may be possible to use one or other of the formulations to control weeds such as illuk and cooch. Preliminary trials with TCA, which is all that it has been possible to carry out to date, appear promising, but there are indications of marked toxicity to tea. It is hoped to carry out more extensive trials with all these new formulations in 1952.

Pentachlorophenol is a general contact type weed killer and as such is undoubtedly toxic to tea.

Field Experiments. Two of our long term experiments completed cycles during the year. Some of the more interesting results obtained are briefly indicated below:—

(1) **Pruning Cycle Increment Experiment.** This experiment completed its 4th cycle at the end of October. As previously the only marked responses are those due to the form in which nitrogen has been supplied, which are detailed in Table 4.

Table IV. *Effect of form of nitrogen on yield in lbs. per acre.*

Form of Nitrogen	1st year	2nd year	3rd year	Total yield	Decrease on S/A
Nitrate of Soda	604	424	657	1685	308
Sulphate of Ammonia	704	520	769	1993	—
Mixture of N/S and S/A	689	496	738	1923	70
Mean	666	480	721	1867	

Expenditure of field experiments has continued to increase rapidly due to rising costs of labour and manures and continuance of experiments which are unlikely to yield further information can no longer be justified. For these reasons, therefore, it has been decided to hand this experiment back to the estate after leaf and soil samples have been collected for analysis by the Chemical Division at the time the bushes reach the tipping stage early in 1952.

(2) **Cultivation and Weeding Experiment.** This experiment completed its 4th cycle in March and the average yields have already been made use of to provide an estimate of the extent of crop losses due to blister blight on St. Coombs (*Tea Quarterly*, Volume XXII, Part II, page 90). The experiment was last reviewed in detail by Dr. Eden at the end of the 3rd cycle and it accordingly seems fitting that the results should be brought up to date in the present report.

The losses due to weeds continue to follow the same pattern as can be seen from the comparative figures for the last three cycles given in Table 5.

Table V. *Percentage gain or loss of crop due to weeds.*

	1st year	2nd year	3rd year	4th year	Cycle
Second cycle	— 7.4	— 7.0	— 1.4	+ 4.3	— 1.5
Third cycle	—16.5	—14.8	— 9.5	— 1.2	— 8.7
Fourth cycle	— 9.0	— 4.5	+ 0.5	+ 1.5	— 2.4

It may be noted that any appreciable loss due to weeds is now entirely confined to the first year, which is the pattern to be expected once the lighter pruning now recommended has had its effect. Provided therefore that weeds can be satisfactorily suppressed following pruning by thatching or other means it is reasonable to suppose that the weed problem will entirely disappear once a good cover of tea has been established.

Intensive (thrice yearly) cultivation in both rows still continues to exert a small but regular depressant effect on yield as compared with normal (once yearly) cultivation. The extent of this effect, expressed as a percentage of the mean yields, can be seen in table 6.

Table VI. *Percentage loss of crop due to intensive cultivation*

	1st year	2nd year	3rd year	4th year	Cycle
Third cycle	2.4	4.2	4.7	2.4	2.4
Fourth cycle	1.4	2.4	4.2	4.5	3.3

The residual effect of the original Adco compost treatment, which has persisted on this experiment up to the end of the 3rd cycle, or for some 12 years, now appears to have finally disappeared since the Adco treated plots gave an annual average of only 2 lbs. per acre more yield than the untreated plots during the fourth cycle.

As previously remarked this experiment suffered from blister blight attacks during the whole of the last cycle, with a consequent reduction in overall yields and nitrogen efficiency. Now that spray protection is being adopted as standard for all manurial experiments it will be interesting to see what responses are obtained during the present fifth cycle.

G. B. PORTSMOUTH,
Plant Physiologist

REPORT OF THE PATHOLOGIST FOR THE YEAR 1951

Staff. Mr. C. A. Loos was appointed Pathologist with effect from 20th April, 1951.

Mr. B. N. Webster, B.A., M.SC., was appointed Mycologist on 1st August. Prior to his arrival in Ceylon on December 25th, Mr. Webster spent several weeks in research stations in East Malling, Long Ashton and Rothamsted. Dr. S. P. Wiltshire, M.A., D.SC., Director, Commonwealth Mycological Institute, Kew, Surrey, very kindly undertook the general direction of Mr. Webster's activities in the United Kingdom.

Mr. W. T. Fonseka left this department on the 7th September to take up his new appointment as Small Holdings Advisory Officer.

Mr. M. K. Vytilingam and D.C. Nugawela were appointed on 21st June, as temporary assistants on the blister blight research programme.

Mr. S. N. Vander Wal, Technical Assistant, left the Institute on August 30th prior to his departure to Australia.

Mr. S. Murugiah, Field Assistant, was promoted to the Assistant Staff Grade III (Field) from 1st May.

Dr. J. W. Pfaeltzer of the Koninklijke/Shell Laboratorium, Amsterdam, arrived in Ceylon on 25th May to continue with his experiments on blister blight control. Mr. Vytilingam was released from other duties to assist Dr. Pfaeltzer in his field experiments.

Mr. Nugawela was transferred to Passara to supervise the dusting experiments on Ury Group.

Mr. E. S. Rajiah, Assistant to the Plant Physiologist, was released from the Physiology Department to supervise the dusting experiment on Dessford Group, Nanuoya. I have to thank the Physiologist for making Mr. Rajiah's services available during that period.

Advisory. 1,032 letters were received and 1,083 despatched. 397 consignments of specimens were received for report.

Blister Blight. As in previous years the main activity of the department centered on blister blight research.

Due to the good weather conditions which prevailed the tide of the disease was at a fairly low ebb through-out the monsoonal months this year. The very heavy rains experienced in June (33.25 inches on St. Coombs, Talawakelle, and over 60 inches in the Hatton-Kotagala district) were not conducive to the build up of infection. Prolonged light rain and mist during the period 26th June to 26th July provided ideal conditions for the disease but with the advent of bright sunshine and rainless nights between 27th July and 3rd August a potentially heavy build up of infections was reduced to a low level. A number of rainless days, sufficiently staggered through August, continued to keep blister attacks at a fairly low level. From 24th August a further period of sunshine eliminated the possibility of attacks during the closing months of the south west monsoon.

Dusting, a fairly new venture in blister blight control has yet to be assessed under conditions favourable to the disease. The effectiveness of wettable copper formulations has, however, been proved beyond reasonable doubt during the very severe blister blight attacks in 1950 (*Tea Quarterly*, Vol 21, Part 4, December 1950, pp. 11 - 16 and pp. 16 - 21).

Power Dusting with "Cuprosana" Dusts Containing 2, 4 and 6 per cent. Copper: Full details and results of this experiment which was set out on Dessford Group, Nanu Oya, have been published in the *Tea Quarterly*, Vol. 22, Part 4, December, 1951, pp. 126 - 132.

Trials with Proprietary Formulations of Copper Fungicide Dusts. A small scale experiment for the evaluation of 13 different fungicidal dusts was conducted on the Cairness Division of Mattakelle Estate, Talawakelle. The dusts were applied by means of hand dusters at the following application rates:—

5 lbs. per acre every 5 days
10 lbs. per acre every 5 days
10 lbs. per acre every 10 days.

The results of this experiment will be published in an early issue of the *Tea Quarterly*.

Ury Group, (Mahapahagalla Division), Passara, Crop Protection Experiment: The results of the dusting experiments on Dessford Group and Mattakelle Estate indicated that adequate protection of tea in bearing may be possible with applications of 5 lbs. of 4 per cent "Cuprosana" copper dusts applied at 5 day intervals. A large scale experiment was, therefore, set up on the Mahapahagalla Division of Ury Group, Passara. This experiment covered approximately 116 acres.

The treatments over the area were as follows:—

(1) 4 per cent "Cuprosana" applied through the Whirlwind power duster.
(2) 4 per cent. "Cuprosana" applied through hand dusters.
(3) Perenox spraying through the "Vermorel" Knapsack sprayers with the fungicide at a concentration of 4 ounces in 10 gallons water and an application rate of, approximately, 15 gallons per acre, every 10 days.
(4) Unprotected area.

The experiment continues into the early months of 1952. The results will be published in the *Tea Quarterly* at the earliest opportunity.

Alupolla Estate, Ratnapura, Dusting Experiment: This experiment was also on a fairly large scale. The experimental areas lay between 1,500 and 3,000 feet elevation. "Cuprosana" 2, 4 and 6 per cent. copper were applied through both the Whirlwind machine and hand dusters.

Results of this experiment will also be published at an early date in the *Tea Quarterly*.

"Micron" Power Sprayer: The results of the trials conducted with the "Micron" power sprayer in connection with the application of oil-based copper fungicides have been published in the *Tea Quarterly*, Vol. 22, Part 4. December, 1951, pp. 133 - 136.

Loss of Crop Experiments: Reference should be made to the *Tea Quarterly*, Vo. 21, Part 4, December, 1950, pp. 16 - 21, for full details of the scope and extent of the three experiments (two on St. Coombs and the other on Kataboola Group). Tables 1 - 3 give crop returns and other data up to December, 31st 1951.

Table 1. *St. Coombs No.* 9 *Field Crop Protection experiment Crop returns for* 1949, 1950 *and* 1951.

	Yields expressed as pounds made tea per acre			Increase in yield over unprotected plots	
	Unprotected	Protected Weekly	Protected fortnightly	Protected weekly	Protected fortnightly
1st year (23rd May to 31st December 1949)	329	414	410	85 (+26%)	81 (+25%)
2nd year (1st Jany. to 31st December, 1950)	631	815	778	184 (+29%)	147 (+23%)
3rd year (1st Jany. to 31st December, 1951)	829	1058	890	229 (+26%)	151 (+18%)
Total for 3 years	1789	2287	2168	498 (+28%)	379 (+21%)

*Sprayed with Perenox at a concentration of 4 ounces in 10 gallons water at an application rate of 12 gallons per acre.

Table II. *St. Coombs No.* 8 *Field Crop Protection Experiment: Crop returns for the period* 19*th May*, 1950 *to* 31*st December*, 1951.

	Yields expressed as pounds made tea per acre			Increase in yield over Plot A	
	Plot C* sprayed S.W. monsoon only	Plot B* sprayed both monsoons	Plot A Unprotected	Plot C* sprayed S.W. monsoon only	Plot B* sprayed both monsoons
1st year (May—Dec. 31 1950)	479	524	315	164 (+52%)	209 (+66%)
2nd year (1st Jan.—31st Dec. 1951)	1269	1414	1091	178 (+16%)	323 (+30%)
Total for 2 years	1748	1938	1406	342 (+24%)	532 (+30%)
Total No. of sprayings	30	60	0	—	—

*Sprayed with Perenox at a concentration of 4 ounces in 10 gallons water at an application rate of 12-14 gallons per acre every 9 or 10 days.

Kataboola Loss of Crop Experiment. The experiment ceased on October 15th, 1951, as it was found more convenient to continue with the replicated and field scale experiments commenced on St. Coombs in April, 1951. The experience gained on Kataboola has simplified design of a more accurate experiment on St. Coombs.

Table III. *Kataboola Loss of Crop Experiment: Crop returns for the period 24th June* 1950, *to 1st October*, 1951, *expressed as pounds made tea per acre.*

Plot	Treatment	Crop as lbs. made tea p.acre	Crop returns in comparison with unprotected Plot No. 1
1	*Unprotected.* Normal plucking at 10 day interval	936	——
2*	*Protected weekly.* Normal plucking at 10 day intervals	1065	+ 129
3*	*Protected every 10 days. Normal* plucking at 10 day intervals	1030	+ 94
4**	*Unprotected.* Plucked to fish leaf on 7 day rounds on shoots which formed a bud and two leaves above fish leaf	1082	+ 146
5	*Unprotected.* Normal plucking on 7 day rounds	867	— 69

*Sprayed with Perenox at a concentration of 4 ounces in 10 gallons water at an application rate of 15 gallons per acre.

**Rested 21st November, to 24th December 1950. Rested again from 6th August to 27th August, 1951, on which date light plucking at a higher level commenced.

St. Coombs No. 2 Field Crop Protection Experiment. This experiment which incorporated the agricultural method of blister control by fish leaf plucking and that of spray protection was conducted under estate management. The experimental area which was pruned in November 1950 and finally tipped in April 1951 was divided by a ravine into two blocks A. & B.

Block A (5.231 acres) was fish plucked for a prescribed period and then rested with spray protection and light plucking until a new plucking level was achieved, after which fish leaf plucking, without spray protection, was recommended. It was envisaged that each period of fish leaf plucking would be of 4 - 4½ months duration followed by a resting, or recovery period, of 1½ to 2 months.

Block B (3.313 acres) received spray protection from 1st May to 31st December at the application rate of 15 gallons of a copper fungicide at 10 day intervals. The area was plucked in the normal manner.

St. Coombs No. 3 Field Crop Protection Experiment. This experiment was on a field pruned in December 1950 and brought into plucking without spray protection during the dry weather. The experimental area was

divided into five blocks each block consisting of 4 plots with a randomized distribution of treatments. The treatments which were replicated 5 times were as follows:—

(1) **Unprotected.** Normal plucking at 10 day intervals of a bud and two fully opened leaves above a third leaf which was left on the bush at plucking.

(2) **Protected** with Perenox at a concentration of 4 ounces in 10 gallons water applied at 12-15 gallons per acre. This area was normally plucked (as for treatment 1) at 10 day intervals.

(3) **Unprotected** and fish leaf plucked during the south west monsoon only. Fish leaf plucking was commenced on May 1st and continued until September 30th when resting was commenced. On the formation of the new plucking table, after resting, normal plucking was continued without spray protection.

(4) **Unprotected.** This plot was plucked above the fish leaf on shoots which had developed a bud and two fully opened leaves above the fish leaf. Plots were rested after about 4½ months of this type of plucking. During resting a new plucking table two leaves above the old tipping level was built up. The plot was pray-protected with a copper fungicide at 10 day intervals beginning 2 pluckings before resting commenced, and during the resting period. With the formation of the new plucking level fish leaf plucking was recommenced. The experiment will follow the same pattern in 1952.

Although on this experimental block the results were encouraging it may prove inadvisable to pluck a first year field to the fish leaf. Considerable supervision was necessary at pluckings during the resting or recovery period.

An essential requirement before fish leaf plucking is contemplated is healthy tea carrying a good cover of maintenance foliage. Considerable and possibly irreperable damage may result if debilitated tea is subjected to this form of cropping.

Until our large scale experiments have run at least one cycle and information is available on the results of fish leaf plucking, superintendents are advised against using this form of agricultural control of blister blight on a a large scale.

Miscellaneous Diseases. The Cercosporella disease was reported from a number of estates especially in areas where *Acacia decurrens* is interplanted with tea. The rather extensive establishment of *Acacia decurrens* shade on estates between 2,500 and 5,000 feet elevation may lead to extensive damage from cercosporella. There were increased indications that the disease was more widespread following the increased planting of *A.decurrens* as a shade tree.

C. A. LOOS,
Pathologist.

PASSARA SUB-STATION

Mr. G. D. Austin reports as follows:—

Correspondence. Correspondence continues to increase and the number of letters despatched in 1951 exceeded a thousand. Over a 100 consignments of insect pests and diseases of tea and associated crops were received for examination and report.

Demonstrations. As the Crop Protection Course for the whole of Uva took place in Badulla early in May no demonstrations were held at the substation till September when a practical course on contour-planting was arranged mainly for Assistants and Estate subordinate staffs. Attendance at the two sessions was 75 and this was considered satisfactory since the course was open to only three planting districts.

Field Experiments. The Passara staff supervised the following Experiments:—

Passara Manurial Experiment No. 2. This is a N.P.K. manurial experiment originally laid down by Dr. Eden in 1934 and now in its 7th cycle (1950 - 1953). The plots received their first application of manure in the present cycle in April, 1951 exactly a year after pruning. Pluckings are made weekly and all data from the 72 pluckings recorded up to the end of 1951 were sent up to St. Coombs.

A shot-hole borer experiment is superimposed on this manurial experiment. Broken branches (due to the presence of borer galleries in the stems) are collected after each pluck. Breakages are then tabulated under the various manurial treatments with a view to ascertaining whether any of the manures influence the incidence of borer.

A Trace Element Experiment as initiated by the Agricultural Chemist, was started on Gonakelle in a field just recovering from pruning and at an elevation of 3,500 feet. The experiment consists of 2 treatments (applied as sprays) and a control distributed over 18 plots covering an acre of 3000 bushes. The plots were sprayed in August and September, three months after they were pruned and first plucked in October. Weights of all weekly pluckings are recorded carefully and sent up to St. Coombs. A parallel experiment was laid down on Nayabedde Estate, Bandarawela.

A Crop Protection Experiment wherein the relative efficacy of spraying and dusting for the control of blister blight under North East Monsoon conditions in Uva was started by the Pathologist on the Mahapahagalla Division of Ury Group, Passara. Assistance from the Passara Sub-station was afforded when members of the staff supervised 57 of a total of 86 operations (spraying and dusting) up to the end of December, 1951.

Pests & Diseases in Uva. Only six estates—three round Badulla and three from Passara—reported the presence of this caterpillar pest during the year. This is one of the smallest number of estates to report outbreaks since nettle grub was declared a pest in 1932. As in previous years the chief species responsible for the 1951 outbreaks of *Natada nararia* popularly known as the Fringed Nettel Grub. With the exceptions of one estate in the Passara District which resorted to spraying with soap solutions for the control of caterpillars, and two estates in the Badulla area which concentrated on the collection and destruction (by burning) of cocoons, the remaining outbreaks were eventually brought under control by natural agencies like hymenopterous larval parasites and a disease known as "Wilt".

Shot-hole Borer (*Xyleborus fornicatus*). After a lapse of some years, during which hardly any queries were addressed to the Passara Sub-station regarding this serious pest of tea, a couple of estates expressed concern over the considerable amount of die-back which these beetles were causing the tea recovering from pruning. The shot-hole borer problem, however, continues to be investigated. Four field experiments—two in Uva and two in Sabaragamuwa—with insecticidal sprays carrying residual effects and applied at time of pruning to prevent beetles building up populations as the cycle advances were started during the year.

The following insect pests of tea were also reported as causing concern:—

Red Slug (*Heterusia cingala*) defoliating mature foliage. Fortunately caterpillars are quickly controlled by fly and hymenopterous parasites and a bacterial disease.

In Tea Nurseries:—Tea Aphis (*Toxoptera aurantii*), Red Spider (*Paratetranychus bioculatus*) and Cutworms (*Agrotis sp.*) called for insecticidal treatment.

In New Clearings:—Red Borer (*Zeuzera coffeae*) and a cricket (*Gymnogryllus humeralis*) turned out to be rather serious in two new clearings.

Diseases. Poria and Brown Root disease continue to be the chief root diseases responsible for the death of most bushes received for examination.

Multiplication Plots. A few multiplication plots were started on the old nursery site on Gonakelle and close to the Laboratory. Clonal plants from selected clones at St. Coombs and two estates were received for establishment and these are under observation.

Green Manures. On the demonstration plots the following green manures grew luxuriantly under Uva conditions.

Crotalaria anagyroides
Crotalaria brownei
Crotalaria grahamiana
Crotalaria spectabilis
Desmodium gyroides
Indigofera arrecta
Sesbania cinerescens
Stylosanthes gracilis
Pueraria phaseoloides

REPORT OF THE ENGINEERING DEPARTMENT FOR THE YEAR 1951

Staff. The following additional staff were employed during the year:—

Mr. R. A. Daniel (Clerk-Storekeeper) transferred from St. Coombs Estate. Mr. W. R. Solomon (Electrician) transferred from St. Coombs Estate. An apprentice mechanic and two labourers were also engaged.

Workshop. This was completed in the early part of the year after which the machinery and test apparatus for spraying equipment was installed.

Crop Protection. A considerable amount of test work on spraying equipment was again carried out. A Ferguson tractor was purchased for investigations on the suitability of power charging equipment and on systems of water transport for knapsack sprayers.

Electrical Installation. Recommendations were received from the Department of Government Electrical Undertakings on the supply of power to the Institute, and we hope to implement these next year.

Water Supply. Several new pipe lines were installed for estate labourers' quarters. During the months of March and April there was a shortage of water on our main reservoir, however, the supply was maintained by careful control until the S.W. monsoon broke.

Buildings. The extensions to the laboratory and the new Junior Staff Recreation Club were completed by Messrs M. Y. Hemachandra & Co. (Builders) Limited. The estate baas completed a set of new quarters for the Junior Staff Dhoby incorporating an ironing room and drying shed. A block of existing quarters was reconditioned with the addition of waterbourne sanitation.

The usual maintenance work was carried out on the Institute's bungalows and buildings.

J. LANDRETH,
Engineer.

REPORT OF THE SCIENTIFIC OFFICER LOW-COUNTRY SUB-STATION FOR THE YEAR 1951

General. The year was notable mainly for the fact that the Tea Research Institute had, by the end of the year, a firmly established sub-station in the Low Country—an achievement which represents the implementation of a suggestion from various Low-Country Planters' Associations made first as long ago as 1941. This sub-station, which enables the Tea Research Institute to carry out experiments and to extend its advisory service in the Low-country consists of the following:—

1. Pembroke Estate Bungalow (Bombawala, near Kalutara)—the headquarters of the Scientific Officer responsible for experimental and advisory work in the low-country, and

2. Experimental areas on Vogan Estate (Matugama), where arrangements have been made to lease ten acres (4 acres of cleared land and 6 acres of old rubber). The Manager of Vogan Estate was also kind enough to allow us facilities for carrying out experiments in old tea.

It should be recorded that the sub-station was constituted in this form after the Board of the Rubber Research Scheme had cancelled the draft agreement made with them the previous year for the gradual acquisition by the Tea Research Institute, of Nivitigalakelle where preliminary work in connection with the opening of nurseries and clearing land for multiplication plots was in progress at the beginning of the year.

Vegetative Propagation. Multiplication plots were established on part of the 4-acre block of Vogan Estate with some 3,000 V.P. plants from the nursery and multiplication plots at Nivitigalakelle, a small nursery was also established adjacent to this block.

A number of low-country estates continued to co-operate with us by making further contributions of selected clonal material, and during the year over 5,000 plants consisting of fresh and rooted cuttings from 75 clones, were collected. With 183 clones represented altogether a unique core of selected clonal material has been established, from which the outstanding clones will be selected for further propagation and planting in due course.

Although nearly all the clones received represented the "cream" from the much larger original selections in the estates from which they came, the wide range of rooting success (10% - 90%) makes it appear that sufficient attention is, perhaps, not always paid to this most important basic characteristic, and underlines the necessity, before undertaking large scale planting, of selecting only a few outstanding clones from trials with large numbers of mother bushes.

Manurial and other Experiments. (1) A long term N.P.K. experiment was started on Vogan Estate, designed to discuss the response to the three main nutrient elements in combinations of the following amounts—nitrogen 39 and 78 lbs./acre, phosphoric acid 18 and 36 lbs./acre and potash 24 and 48 lbs./acre.

(ii) A minor element experiment was laid down, also on Vogan Estate.

(iii) Small scale trials with a number of green manures and cover crops likely to be useful for growing in tea were started at Pembroke.

(iv) An experiment designed to test the efficiency of gammexane in the control of shot hole borer was laid down in the Ratnapura District.

(v) An experiment with dusting as a means of blister blight control was carried out, also in the Ratnapura district, results from this experiment were, however, inconclusive owing to the exceptionally fine weather experienced during most of the period of the experiment.

Rainfall and Crops. From the Planters' point of view the year was memorable mainly for the series of droughts during the second half of the year. Thus, although the total rainfall for the year was above normal, it was so unevenly distributed that losses on new clearings were often as high as 60%. Losses of crop due to drought were, however, to a very large extent offset by the exceptionally high prices prevailing—which often exceeded the prices realized by corresponding grades of some up-country teas—while in areas normally subject to appreciable losses from blister blight, yields were above expectation.

T. E. WALTER,
Scientific Officer,
Low-Country Sub-Division.

REPORT OF THE OFFICER-IN-CHARGE, T. R. I. SMALL HOLDINGS ADVISORY SERVICE FOR THE YEAR 1951

The need for expanding the Small Holdings Service of the Tea Research Institute had made itself increasingly felt in previous years, and it is gratifying to record that the year under review saw this service reconstituted on lines adequate to the demands of the moment and of the foreseeable future. Since its inception, the strength of this branch of the Institute had been limited to three officers stationed at Gampola, Baddegama and Morawaka. On the other hand the distribution of tea small holdings in the various provinces, as given in the last Census Report, is as follows:—

Central Province	...	39,000 acres
Southern Province	...	14,000 acres
Uva Province ...	...	7,000 acres
Sabaragamuwa Province		15,000 acres
Western Province	...	2,000 acres

When it is remembered that more often than not, these holdings are scattered widely apart, it will require little persuasion to show that the task of establishing liasion with thousands of title holders and guiding them in the development of their land was well beyond the physical capacity of three men.

But organised even on the modest scale at which it stood, the advisory service absorbed 10% of the Tea Research Institute's revenue and further extension was deemed impossible within the limit of the Institute's budget. Meanwhile, both agriculturally and politically the small holder was to acquire an enhanced position in the life of the country.

The Board of Management, therefore, appointed a Sub-Committee to study the question of re-organising the Small Holdings Advisory Service and of providing funds to finance its development on lines that would ensure some practical benefit to the average small holder.

The Sub-Committee put forward proposals under which—

(1) The Small Holdings Service was to be reconstituted under an officer-in-charge with its headquarters at Peradeniya.

(2) The principal tea growing areas were to be re-staffed by officers attached to the branch in the following order:—

One Officer-in-charge of the Scheme with headquarters at Peradeniya.

Central Province	...	2 Small Holdings Officers and 7 Tea Instructors.
Southern Province	...	1 Small Holdings Officer and 3 Tea Instructors.
Sabaragamuwa ,,	...	1 Small Holdings Officer and 3 Tea Instructors.
Uva Province	...	1 Small Holdings Officer and 2 Tea Instructors.

(3) Funds for the expansion of the service were to be sought in the form of an increase of 5 cents on the present cess.

The Sub-Committee's recommendations were accepted by the Board, and forwarded to the Minister of Agriculture, who in turn, sanctioned the scheme and moved the necessary legislation to bring it into operation.

In October the headquarters of this branch were established at Peradeniya, buildings for this purpose having been leased out for a three-year term by the end of which more suitable accommodation, it is hoped, will be found.

Recruitment to the staff of the Small Holdings Service will be carried out in stages. Four Senior Officers designated Tea Small Holdings Officers have been appointed. These Officers, each having under him a team of Instructors, will direct the activities of the Service in the four major tea growing Provinces.

The new service when fully manned, will count a total of 15 Tea Instructors. The latter are to be recruited in batches of five in view of the limited training facilities and accommodation that is available. Ten Instructors have been appointed to date.

While these young men will in every case have had a theoretical education in agriculture and practical experience of tea cultivation, it is of the utmost importance that they should serve a further period of training at the Tea Research Institute before they could be considered qualified to undertake advisory work on the methods of cultivation and development recommended by the Institute.

Besides this expansion of staff, the Small Holdings Advisory Service is now equipped with a Propaganda Film Unit so as to be able to provide instruction through the visual medium.

The film unit will visit all tea growing areas in the Island in rotation and supplement the propaganda work done by our Instructors.

R. L. ILLANKOON,

Officer-in-charge, Small Holdings Advisory Service

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The Tea Research Institute of Ceylon

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